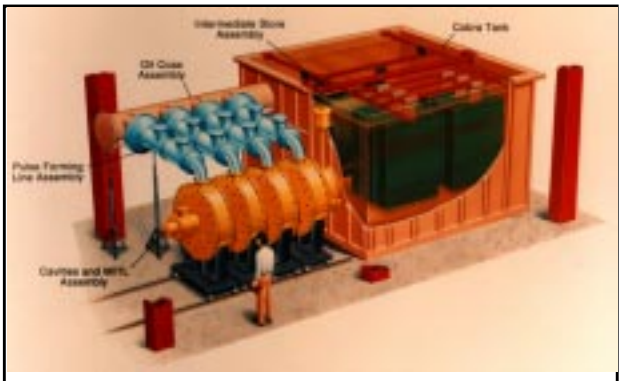
November 1994 Highlights of the Light Ion Inertial Confinement Fusion Program



5-MV, 200-kA COBRA accelerator. Initial tests will use a single SABRE-like cavity.

Presentations were given at the APS Division of Plasma Physics Meeting, the Paris IAEA Meeting on ICF Drivers, and the Symposium on Evaluation of Current Trends in Fusion Research. Topics discussed were pulsed power and ion beam generation, focusing, beam-target interactions, transport, reactor concepts, and the synergy between light and heavy ion fusion. In addition, we hosted a two-day informal Ion Beam ICF workshop at Sandia the week after the APS Meeting.

We are evaluating the experimental priorities for the March 1995 target series on PBFA II through hydrodynamic simulations of lithium-beam-driven thermal targets with 4- and 6-mm-diameter closed cylindrical hohlraums with 6-mm-tall truncated cones. Open cones were used in the March 1993 series: the July/August 1994 target series used 4-mm-diameter closed cylinders. Parts for all three hohlraum geometries will be fabricated at General Atomics and assembled at Sandia. The 4-mm cylinder should intercept the highest intensity portion of the beam, the 6-mm cylinder should minimize effects of beam pointing errors, and the truncated cone should provide the most information about beam characterization and hohlraum response. Preparation of target diagnostics and an assessment of required modifications to the target and to the diagnostics, if the Laser EVaporation Ion Source (LEVIS) is used, are in progress.

Engineering tests of the new PBFA-II hardware to clean anode surfaces were completed in November and the hardware was installed on PBFA II. The first downline experiments with the titanium sublimation getter pump and the RF glow discharge cleaning system begin in December. SCREAMER, TWOQUICK, and QUICKSILVER simulations are being used to identify the diode operational regime that should maximize beam brightness (i.e., minimize divergence and maximize lithium ion beam power).

Pulsed power hardware for a new terawatt-class accelerator, COBRA, was delivered to Cornell University to support our joint research collaboration on extraction diodes and non-protonic ion beams. The hardware includes Marx generators and power supply from DEMON, water lines and gas switch from the Simulation Test Facility, and a Hermes-III intermediate storage capacitor. The figure shows an artist's concept of the completed accelerator. The four induction cavities will arrive the first quarter of FY96.

SABRE experimenets without anode surface cleaning indicated the total lithium beam intensity is increased a factor of two by altering the magnetic field profile and electrode geometry to provide more uniform ion beam emission. New SABRE cleaning hardware includes liquid helium (as opposed to nitrogen) cooling to reduce the further cathode plasma production and a titanium getter pump to limit anode recontamination.

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